

# PATENT SPECIFICATION

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(21) Application No. 30899/75 (22) Filed 23 July 1975  
(44)\* Complete Specification published 8 Sept. 1977  
(51) INT CL<sup>2</sup> B65G 43/00  
(52) Index at acceptance B8A 14 1D13X 1L  
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## (54) DEVICE FOR DETECTING ELONGATION OF A CONVEYOR BELT JOINT

(71) We, NIPPON KONBEYA KABUSHIKI KAISHA (NIPPON CONVEYOR CO., LTD.), a Japanese Company, of No. 1—1, 2-chome Midorigaoka, Daitoshi, Osaka-fu, Japan, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a device for detecting fatigue-caused elongation of a joint of a conveyor belt, more particularly of the kind made of steel cords so that the belt may be prevented from severance likely to occur through continuous use of the belt in such an elongated state.

The invention consists in a device for detecting elongation of a joint in a conveyor belt, comprising a control system, a pair of proximity sensors which are spaced from and in parallel with the belt at a distance from each other that is greater than the length of the joint, a pair of magnetic elements fixed to the undersurface of the belt on opposite sides respectively of the joint and at a distance from each other which, in the unelongated state of the joint, is substantially equal to that between the proximity sensors, whereby in the unelongated state of the joint the two magnetic elements simultaneously pass over the respective proximity sensors during movement of the belt and emit signals simultaneously to the control system, and in the elongated state of the joint the sensors emit signals which are not simultaneous to the control system which on receipt thereof initiates an alarm on stoppage of the conveyor belt.

Needless to say, a conveyor belt particularly of steel cords is less resistant at its joint to tension and accordingly the belt is subjected to severance at its joint through its continuous use when an elongation of the joint has taken place.

In order that this invention may be readily understood, a preferred embodiment

thereof will now be described with reference to the accompanying drawing, which shows, diagrammatically, part of a conveyor belt and a device for detecting elongation of the conveyor belt.

Numeral 1 designates an endless conveyor belt arranged to move in the direction leftwards of the drawing.

Below the belt 1 are arranged parallel therewith a pair of sensors A and B located such that B takes the forward position in the belt moving direction. The sensors A and B are spaced at a distance d from the under surface of the belt 1 and at a distance L from each other which is longer than the length l of a joint 2 of the conveyor belt 1. The sensors A and B act as proximity switches which are able to emit a signal upon the approaching of a magnetic field thereto. Moreover, the sensors A and B are disposed so as to enable the fine adjustment of the distance L between them.

To the under surface of said belt 1 and spaced from opposite sides respectively of (before and behind) the joint 2 are fixed magnetic elements a and b to be sensed by said sensors A and B as they approach, said elements a and b being at a distance l' substantially equal in length to the length L between said sensors A and B so that said a and b respectively may confront (pass over) A or B at the predetermined positions of A and B in the cyclic movement of the endless conveyor belt 1.

The operation of the device will now be described.

With the leftward movement of said belt 1 accompanied with the proximity of said element a to the sensor A, the sensor A emits a signal to a per se known control system (not shown) as to make it ready for functioning at need. When the other element b comes close to said sensor A simultaneous with the approach of element a the sensor B as shown in the annexed drawing, both A and B emit signals simultaneously to the control system in the confirmation of unchanged length of said distance l' and

accordingly the unelongated state of said joint 2. If the joint 2 has developed any elongation the sensor A fails to emit a signal because of the undue distance of said element b therefrom when the other sensor B emits a signal upon the nearing of the other element a thereto, and then the control system emits an alarm for stopping the belt conveyor or directly brings the conveyor to a stop.

When the sensor B emits a signal with the approach thereto of said element b following the simultaneous signals from both A and B through the continuous leftward movement of said belt 1, the control system is freed from its stand-ready position until the arrival of a signal only from the sensor A in the following cycle as referred to before.

As may be self-explanatory, the probable detachment of said element a and b, if it were not for their simultaneous detachment, can be detected inevitably in the aforementioned detecting process. Countermeasures for dealing with such a joint detachment is not taken into consideration in this invention because it may be out of the bounds of possibility.

The device described enables the detection of fatigue-caused extension of a conveyor belt at its joint continuously in every cycle of the belt conveyance wherein are adapted a pair of proximity sensors, another pair of cooperative magnetic elements, and a control system so that one of said sensors may fail to signal when one of said elements fails in properly approaching thereto due to an elongation taking place of said belt joint and as the result said control

system gives an alarm, thus enabling the operation of a belt conveyor made particularly of steel cords without worrying about the severance of said belt in the midst of a belt moving operation.

#### WHAT WE CLAIM IS:—

1. A device for detecting elongation of a joint in a conveyor belt, comprising a control system, a pair of proximity sensors which are spaced from and in parallel with the belt at a distance from each other that is greater than the length of the joint, a pair of magnetic elements fixed to the undersurface of the belt on opposite sides respectively of the joint and at a distance from each other which, in the unelongated state of the joint, is substantially equal to that between the proximity sensors, whereby in the unelongated state of the joint the two magnetic elements simultaneously pass over the respective proximity sensors during movement of the belt and emit signals simultaneously to the control system, and in the elongated state of the joint the sensors emit signals which are not simultaneous to the control system which on receipt thereof initiates an alarm or stoppage of the conveyor belt.

2. A device for detecting elongation of a joint of a conveyor belt, substantially as hereinbefore described with reference to the accompanying drawing.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale*

